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FINAL REPORT

REMOVAL ACTION  
FORMER NORTH END DISPOSAL AREA

UNION WIRE ROPE FACILITY  
KANSAS CITY, MISSOURI

VOLUME I  
TEXT, TABLES, AND FIGURES

PREPARED FOR

ARMCO INC.  
KANSAS CITY, MISSOURI

JULY 30, 1991

PROJECT NO. 90247

REMCOR, INC.  
PITTSBURGH, PENNSYLVANIA

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## 1.0 INTRODUCTION AND SUMMARY

On behalf of Armco Inc. (Armco), Remcor, Inc. (Remcor) has completed a removal action at the former North End disposal area of the Union Wire Rope (UWR) plant site in Kansas City, Missouri (Figure 1). This removal action was performed to fulfill Armco's obligations under the terms of an Administrative Order on Consent (ACO), Docket No. VII-90-F-0019 dated June 29, 1990, between Armco and the U.S. Environmental Protection Agency (EPA), Region VII. The ACO was issued under the authority of Sections 104, 106(a), and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act.

### 1.1 PROJECT DEFINITION

Remcor previously completed an environmental investigation of the former North End disposal area at the UWR site under contract to Armco. The earlier study concluded that lead-containing materials had been deposited together with rubble and debris at this location (Figure 2).



## 1.2 PROJECT SCOPE AND OBJECTIVES

The removal action work plan<sup>(1)</sup> incorporated as Attachment 3 to the ACO ("approved Work Plan") specified two components of the work:

- Excavation and off-site disposal of waste materials
- Ground water investigation.

Excavation and off-site waste disposal were performed to accomplish the following:

- Eliminate characteristic hazardous waste from the site with disposal of such material in permitted off-site facilities
- Minimize the potential exposure to and releases of contamination from nonhazardous lead-bearing wastes and affected soils by excavation and off-site disposal
- Restore the work area to minimize conflict with the U.S. Army Corps of Engineers (COE) plans for rechannelization of the adjacent (Big) Blue River
- Restore the waste area as needed to allow future industrial use of those portions of the site not claimed in rechannelization.

The ground water investigation examined subsurface conditions and the quality of ground water. The objective of this study was to determine whether the quality of ground water in the North End area has been significantly affected by past waste disposal practices at this site. The study also evaluated the extent to which

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<sup>(1)</sup>Remcor, Inc., April 1990, "Work Plan, Removal Action, North End Former Disposal Area, Union Wire Rope Plant Site," Revision 1, Project No. 89119, prepared for Armco Inc., Kansas City, Missouri and Middletown, Ohio.





constituents in the ground water could pose a risk to public health or the environment.

### 1.3 ORGANIZATION OF REPORT

This report summarizes the work performed to satisfy the requirements of the ACO and presents the collected ground water data.

The report comprises three volumes:

- Volume I - Text, Tables, and Figures:
  - Chapter 2.0 summarizes the waste excavation and off-site disposal activities
  - Chapter 3.0 presents the ground water investigation
  - Chapter 4.0 provides Remcor's certification of completion
- Volume II - Appendices A through F provide supporting documentation for waste removal activities
- Volume III - Appendices G through K provide supporting documentation for the ground water investigation.

### 1.4 SUMMARY

Remcor has completed the excavation and off-site disposal of waste materials from the former North End disposal area. In this action, nearly 26,500 cubic yards (yd<sup>3</sup>) of fill materials were excavated with about 17,200 tons of hazardous waste and 13,300 tons of nonhazardous waste removed from the site and disposed of in permitted landfills. All 130 final confirmatory soil samples showed compliance with the cleanup criterion of 238 milligrams per kilogram (mg/kg) total lead. The average (geometric mean) total lead concentration in these samples is less than 36 mg/kg.



After confirmatory sampling and analysis, the former North End disposal area site was backfilled, graded, and seeded.

Remcor also executed the ground water evaluation program specified in the approved Work Plan. Five new and one replacement monitoring wells were installed at the site, and subsurface hydrogeologic conditions were investigated. Two rounds of ground water samples were collected and analyzed for site-defined constituents. As described in Section 3.3, the results of these studies indicate that the ground water conditions at the former North End disposal area do not present an environmental concern. No further action for ground water study or remediation is recommended.



## 2.0 WASTE EXCAVATION AND DISPOSAL

The waste removal action at the former North End disposal area involved exhuming buried waste materials, sorting and staging the excavated material, testing excavated material, loading contaminated materials into vehicles for off-site waste disposal, and verifying completeness of removal. Areas from which wastes were removed were subsequently reclaimed, consistent with probable future land uses. All work was performed in strict compliance with the approved Work Plan.

### 2.1 MOBILIZATION AND SITE SETUP

#### 2.1.1 Mobilization

Remcor mobilized the necessary personnel, equipment, and materials to the former North End disposal area to conduct the waste removal operation in August 1990. Equipment included earthmoving equipment (i.e., track-mounted hydraulic excavator [trackhoe], front-end loader, and bulldozer), a personnel decontamination station, an office trailer, a shower trailer, a tool storage trailer, and site computer.

#### 2.1.2 Site Survey

A preconstruction topographic survey of the former North End disposal area was prepared to establish grades and planned limits of excavation. As described in the approved Work Plan, the



horizontal limits of excavation were based on prior reviews of historical aerial photographs and the results of on-site test pitting.

Initially the survey divided the site into 40-foot wide bands oriented north and south. Later these 40-foot bands were replaced with 40-foot square grids so that horizontal location (control) data in the north-south direction would be easier to obtain (Figure 3).

With the assistance of Armco and Wire Corporation of America (Wireco) personnel, Remcor endeavored to locate underground utilities at the site at the time of the initial site survey. Acid rinse water and other pipeline locations were tentatively identified. Excavation in the vicinity of known lines proceeded cautiously and was completed without incident. Not all utility locations and alignments were known, and several lines needed to be rerouted to allow excavation to proceed. Some of these pipes needed to be replaced after the completion of excavation.

#### 2.1.3 Site Security

Access to the site was controlled by natural and topographic barriers which include the Blue River to the north, the Manchester Avenue Bridge to the east, and the Kansas City Southern railroad bridge to the west. The southern boundary of the site is defined by the preexisting chain-link fence separating the site from the





Wireco operations area to the south. By excavating carefully, Remcor was able to remove on-site waste material to the fence line along the southern boundary of the site.

Access to the excavation work area was through the northern Manchester Avenue entrance of Wireco. Subcontractors and visitors were required to report to the site office trailer prior to observing operations. During construction, access controls proved to be satisfactory, and no unauthorized intrusions were reported.

#### 2.1.4 Health and Safety

Health and safety procedures for site activities addressed the physical hazards associated with heavy-machinery construction as well as issues dealing with the potential toxicological effects of lead. Appendix G of the approved Work Plan defined the health and safety plan used by Remcor to protect worker health and safety.

#### 2.1.5 Soil Erosion and Sedimentation Controls

Prior to the start of the excavation activities, soil erosion and sedimentation controls were emplaced. A silt control fence was erected along the downslope perimeter of the planned limits of excavation (Figure 3). This silt fence was constructed of woven geotextile in accordance with the approved Work Plan. This silt fence was maintained for the duration of the project and remained intact at the completion of construction activities.



#### 2.1.6 Site Facilities

The arrangement of site facilities during construction is shown in Figure 3. This configuration was modified from that shown in the approved Work Plan where facilities interfered with waste excavation. Changes in the site configuration were the following:

- The equipment decontamination pad was moved to an area east (Grid 11B) of its original position.
- The personnel decontamination was moved to Grid 9B.
- The office trailer was moved to the southern half of Grid 10A.

All necessary temporary utilities were installed for these facilities.

##### 2.1.6.1 Personnel Decontamination Facilities

The site setup for removal operations included facilities for Remcor personnel to adequately protect themselves at work and maintain hygiene before leaving the site. A decontamination line was set up at the perimeter of the excavation so that coveralls (i.e., Tyvek® suits) and gloves could be disposed of and boots could be washed before leaving the site. Disposable items were included with the waste sent for off-site disposal. Wash water from the personnel decontamination facility was sent to the Wireco wastewater treatment system.

##### 2.1.6.2 Equipment Decontamination

Vehicles used for transporting waste were decontaminated by pressure washing prior to leaving the site if their tires potentially



came in contact with contaminated material. Additionally, the truck loading procedure was designed to avoid contaminating these vehicles with the wastes being loaded. For trucks that were exposed, a decontamination pad was constructed. This concrete pad was 15 by 25 feet in plan and built on a properly prepared sub-base. Spent wash water from equipment decontamination was pumped from this decontamination pad to the Wireco wastewater treatment facility.

## 2.2 EXCAVATION AND ON-SITE MATERIALS HANDLING

The initial site investigation had identified four general types of fill within the limits of excavation:

- Homogenous black powdery to granular dust
- Mixed lead-containing material and debris
- Mixed lead-containing material soil
- Other fill and construction debris.

Other fill and construction debris included significant portions of concrete, bricks, and metals. Handling procedures for these materials were designed to segregate these materials for efficient disposition.

### 2.2.1 Excavation

Excavation of the waste area was performed by a crew consisting of an operator Koehring 6620 trackhoe, Caterpillar B-250 loader, and technicians under the direction of a foreman. After the initial excavation was completed for siting the personnel decontamination facility, excavation proceeded in east-west bands along



the northern half of the site until the D-, E-, and F-series grids were completely excavated (Figure 3). At this time (mid-February 1991), the excavation proceeded around the equalization (acid rinse water) tank to the southern boundary of the site near Grid 7A. At this time (late March 1991), the screening operation was moved from Grids 4B and 5B to Grids 7B and 8B so that the southwestern portion of the site could be excavated.

In each stage of the excavation, materials were initially excavated downward to the limits of visibly identifiable waste. After the entire 40- by 40-foot grid was excavated, confirmatory samples were collected.

#### 2.2.2 Sorting and Segregation of Excavated Materials

The excavated material was taken by the loader to the on-site screening station. The screening operation consisted of a "grizzly," which is a screen with wide steel bars to separate out large pieces of construction debris from the finer waste products. From the grizzly, the material was sent via a 36-inch wide conveyor to an electric barrel magnet separator. The magnet separated out ferrous metals from the waste and directed these metallic products to a dedicated electric conveyor. The remaining waste was sent to a vibratory screen which separated the fine and coarse fractions. Site experience showed that use of the vibratory screen reduced productivity without significantly differentiating between hazardous and nonhazardous wastes (as





related to grain size). As a result, the vibratory screen was later removed from the screening operation. A flow chart for materials handling and disposition is given in Figure 4. Table 1 summarizes the disposition of waste materials.

### 2.2.3 Characterization of Excavated Waste Materials

After materials were sorted, 200-yd<sup>3</sup> lenticular stockpiles (i.e., windrows) were created with the aid of the loader. The materials in the stockpiles were sampled according to the protocols given in Appendix E of the approved Work Plan. A significant modification to this sampling plan occurred when the extraction procedure (EP) toxicity test was replaced by the Toxicity Characteristic Leaching Procedure (TCLP).

Laboratories were selected based on their ability to meet the demands of 24-hour TCLP turnaround times and analytical data quality. Spiked samples received from an independent laboratory were submitted to four potential project laboratories, with Kansas City Testing Laboratory (KCTL) of Kansas City, Missouri and PSI/Hall-Kimbrell Inc. (HK) of Lawrence, Kansas achieving satisfactory analytical precision. These were the primary analytical laboratories used for the removal action.

Waste characterization samples were collected, documented, and shipped by a Remcor courier to KCTL. Samples were analyzed for TCLP and total lead by EPA (SW-846) Methods 1311 and 7421. If



the TCLP result was 5.0 milligrams per liter (mg/l) or greater, the corresponding material was loaded, manifested, and shipped as hazardous waste. If the result was less than 5.0 mg/l TCLP lead by KCTL's analysis, a resample was submitted to HK for 24-hour TCLP and total lead analysis. If HK's result verified KCTL's result, the 200-yd<sup>3</sup> pile was shipped as industrial waste. Duplicate (split) samples were also taken as laboratory quality control in accordance with the approved Work Plan. Except in instances where the total lead analysis result was very low, non-hazardous waste was not shipped without two independent laboratory analyses verifying the nonhazardous nature of the waste.

Sample nomenclature for waste characterization samples consisted of a four-part alpha(a)-numeric(n) code with the following format:

n1-n2-n3-a1

where:

n1 = month sample was collected

n2 = day of month sample was collected

n3 = sequential sample number

a1 = degree of processing:

- PLF (pile of fine material screened through the vibrating shaker screen)
- PLC (pile of coarse material passing through the grizzly and not metallic)
- PLE (pile of excavated material, not screened).



A summary of all waste characterization data is provided as Appendix A. Chain-of-custody records for the waste characterization samples are combined with the confirmatory sample records in Appendix B. Analytical reports for waste characterization samples are combined with the confirmatory sample data reports in Appendix C.

#### 2.2.4 Fine and Coarse Fraction of Waste Materials

The fine fraction of the waste was comprised of soils and black dusts separated from the coarser wastes by a shaker screen. Because these materials were typically determined to be hazardous by the TCLP, windrows were always covered with polyethylene sheeting at the completion of 200-yd<sup>3</sup> stockpiling to reduce the potential for fugitive dust during windy conditions. Dust from fine materials was also controlled by sprinklers placed on the site during dry, windy conditions.

The coarse material was placed into 200-yd<sup>3</sup> windrows and sampled in similar fashion to the fine fraction. Coarse material consisted of the material which passed through the grizzly and barrel magnet. At the completion of each day's work, windrows were measured for volume, covered with a polyethylene sheeting, and secured with concrete pieces and bricks from the landfill.

The quantities of this type of waste were estimated from trucking manifests and bills of lading. The total quantity of excavated



fine and coarse material was 23,367 yd<sup>3</sup>, of which 10,680 yd<sup>3</sup> were industrial (nonhazardous) waste and 12,687 yd<sup>3</sup> were hazardous waste (Table 1). Inventories of hazardous and industrial waste shipments are provided in Appendix D.

#### 2.2.5 Concrete and Construction Debris

Large pieces of concrete (e.g., demolished foundations) were separated from the other waste, pressure washed, and used as riprap on storm water outfalls and on the perimeter of the site. The total amount of this concrete material excavated and used as riprap is estimated at 1,000 yd<sup>3</sup>.

#### 2.2.6 Metal Scrap

Scrap wire and metal fragments were separated from the other wastes by the electric barrel magnet. This material was shipped to a local scrap metal processing center by a local hauling company and recycled. The total weight of this material was 4,478 tons (Appendix D).

### 2.3 CONFIRMATORY TESTING

After excavation, Remcor sampled each 40- by 40-foot grid at the 0- to 6-inch depth and the 6- to 12-inch depth with a bucket-type hand auger. In some cases where grids or excavation limits were significantly smaller than 40 by 40 feet (i.e., grids next to Blue River and at site perimeter), confirmatory samples were combined for adjacent grids. Overall, confirmatory samples were





collected on an approximate density of one sample per 1,600 square feet ( $\text{ft}^2$ ) of excavated area, rather than the once per 2,000  $\text{ft}^2$  specified in the approved Work Plan.

If the lead concentration exceeded 238 mg/kg, the grid was further excavated and resampled. This process continued until the total lead analyses confirmed that the cleanup standard was achieved. Table 2 and Figure 5 present the total lead analysis results for all final confirmatory samples. As shown in this table and figure, all 130 final confirmatory soil samples exhibit less than 238 mg/kg total lead. The average total lead concentrations in these materials (i.e., medium and geometric mean values) are in the range of 30 to 36 mg/kg. Results of total lead analyses of soil samples taken as confirmatory samples, but subsequently shown to require additional excavation, are included in Appendix C.

The approved Work Plan envisioned sampling of the excavation side walls at the limits of the excavation. During the removal action, however, the excavation proceeded until the lower limit of the waste intersected the ground surface along the eastern, western, and northern limits of the waste fill area. On the south side, excavation proceeded to the defined limits of the site. Accordingly, no excavation side wall samples were analyzed.



Evaluation of confirmatory samples also included field screening of volatile organic compounds (VOCs) by a photoionization detector. The methods used for field screening for VOCs were those specified in Appendices E and F of the approved Work Plan.

Other analyses performed on the confirmatory samples included VOC analysis (3 samples) and Contract Laboratory Program Data Deliverable Packages (CLP/DDPs) on over 20 percent of the grids (15 samples). The collection, shipping, and handling of samples were performed in accordance with Appendix E of the approved Work Plan.

The VOC analyses were performed by Wadsworth/ALERT Laboratories, Inc. (WAL) of Pittsburgh, Pennsylvania. The WAL analyses showed the only VOC above the detection limit to be methylene chloride. Methylene chloride concentrations were 15 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) in Sample 05-08-206-VOA. Although methylene chloride was not found in the laboratory blank, the concentrations detected in these two samples were low enough that laboratory contamination by this compound is realistic. Other compounds detected below the practical quantification limits (J values) include ethylbenzene at 5.0  $\mu\text{g}/\text{kg}$  in Sample 05-08-203-VOA and 1,2-dichloroethene at 3.8  $\mu\text{g}/\text{kg}$  in Sample 05-08-206-VOA. VOC analysis results are included in Appendix C.



The CLP/DDP total lead analyses were performed by HK. This procedure was a quality control measure to assure the reproducibility of total lead analytical results from the standard 24-hour turnaround testing. All CLP/DDP samples that were a reanalysis of the 24-hour turnaround total lead samples reconfirmed the 24-hour turnaround result of confirmed clean or a failed grid. Analytical results of the total lead results are combined with the waste characterization results in Appendix C.

#### 2.4 SITE RESTORATION

Confirmed clean soil imported from a local borrow pit was used to backfill completed and confirmed clean areas of the site. The material was placed to achieve the following:

- A continuous slope gradually draining toward the Blue River
- Continuous terrain in the area of the acid rinse water tank and hydrochloric acid storage tank
- Continuous gradual slope to the existing roadway north of Building 30.

Minimal regrading was conducted in the area of the planned COE work limits. A post-construction topographic map of the site is included as Appendix F.

After grading was completed, disturbed areas were seeded with a mixture of rapid-emergent and erosion-resistant grasses. Riprap was placed along pipe outlet channels and the river bank.



### 3.0 GROUND WATER INVESTIGATION

This chapter describes the methods used for installing monitoring wells, sampling ground water, and conducting aquifer tests. The results of these studies are also presented.

#### 3.1 INVESTIGATION METHODS

##### 3.1.1 Installation of Monitoring Wells

In February 1991, Remcor installed two deep wells (MW-3D and MW-1D) and three shallow wells (MW-10, MW-11, and MW-12) at the site in accordance with the approved Work Plan. Wells MW-1D and MW-3D were installed adjacent to Wells MW-1 and MW-3, respectively, to provide well clusters for evaluating the aquifer at depth (Figure 2). Wells MW-10, MW-11, and MW-12 were installed as shallow wells located in close proximity to the Blue River and downgradient of the former fill area (Figure 2).

Borings for monitoring well installation were drilled by a geotechnical drill rig using hollow-stem augers. Drilling was logged by a Remcor hydrogeologist by collecting soil samples (CME™ continuous sampler). Boring logs are included in Appendix G.

Because of deep excavation for waste removal, existing Well MW-2 needed to be permanently abandoned and replaced. Remcor sealed Well MW-2 by grouting the well in place. A lean mixture of grout





was placed in the well. The overflow of grout over the top and outside of the casing formed an effective seal to prevent water from entering the former well. The well location was then brought to grade by placing approximately eight feet of clean backfill.

Upon closure of Well MW-2, Remcor replaced the well; Well MW-2A (so designated to distinguish it from the abandoned well) was located approximately 10 feet south of the former Well MW-2 (Figure 2). Due to the close proximity of the two wells, the latter well was drilled without collection of soil samples and was logged by observation of drill cuttings.

To reduce the potential for cross contamination, auger flights and other downhole equipment were pressure washed with hot water prior to use at each well. Additional measures to reduce the potential of cross contamination included the washing of polyvinyl chloride (PVC) well materials that were not already decontaminated and contained in factory-sealed boxes prior to installation.

Wells were constructed of 2-inch (inside diameter), flush-joint PVC riser and a 5-foot length of factory-slotted 0.010-inch well screen. Wells were typically set with a sandpack extending several feet above the screen and a bentonite pellet seal one to two feet thick, placed immediately above the sand pack. In each case, bentonite or cement-bentonite grout was placed in the



annular space of the well from the top of the bentonite pellet seal to the ground surface. Protective steel casings (with locking caps) extend 1 to 3 feet above the ground. The supervising hydrogeologist for each well completed a well construction diagram detailing the placement of the screen, riser, sand pack, bentonite seal, grout seal, and protective casing. These diagrams are included in Appendix G.

Upon completion of construction, each well was developed. The method of development used in most cases was to bail the well for an extended period of time until the suspended fine soil particles were removed. Alternatively, some of the wells were developed by the air-suction method. This technique involves placing an open-ended drop pipe in the well with an air line suspended in the drop pipe. The well was pumped by releasing air in the air line, which caused a suction at the end of the drop line. The injection of air was controlled so that no air was permitted to escape the drop line and enter the formation through the well screen. The air-suction procedure was conducted until the well produced clear water free of fine-grained sediment.

Each well was included in an elevation survey conducted by a registered land surveyor. These surveys have been referenced to benchmarks located on the Manchester Avenue bridge abutment (Figure 2). The elevations of the measuring point at each monitoring well and the benchmarks were determined to the nearest 0.01 foot.



Appendix G, Table G-1 includes elevation data for the wells at the UWR plant site.

### 3.1.2 Ground Water Sampling and Analysis

Sampling of ground water at all site wells was performed in March and May 1991. Samples were collected from previously installed site Wells MW-1 through MW-9 (including MW-3A) and newly installed Wells MW-1D, MW-3D, MW-10, MW-11, and MW-12.

#### 3.1.2.1 Sampling

Before sampling, water levels in the wells were measured to the nearest 0.01 foot, and the volume of the water column in each well was calculated. A minimum of three well volumes of water was purged from each well prior to sampling using a dedicated stainless steel bailer or submersible pump.

Samples were collected following purging using dedicated decontaminated bailers. Samples were placed in laboratory cleaned sample bottles that were appropriately preserved and affixed with sample identification labels. Table 3 lists the sample bottles and analytical methods used for the ground water samples collected at the UWR plant site.

Immediately upon collection, samples were placed in coolers (iced to approximately four degrees Celsius) for shipment to the analytical laboratory via an overnight courier. Sample chain-of-custody and analysis request forms were completed and accompanied



the sample shipments. The numbering system used for all ground water of samples consisted of the following:

- A three-digit project identifying prefix (i.e., "RAU" indicating - Remcor/Armco/Union Wire Rope)
- A five-digit well identification code to denote the source well (e.g., "MW-001")
- A two-digit suffix representing the sample event in chronologically sequential order (i.e., "01", "02",...).

A field blank was prepared for each set of samples using laboratory-provided deionized or distilled water. This water was rinsed through a decontaminated sample bailer, collected in appropriate sample bottles, and submitted for analysis. The sample identification for the field blanks followed the sample nomenclature used for all other well samples; the source code used was MW-0. A replicate sample (designated with the source identifier "MW-006R") was collected from Well MW-6 during each sampling event.

#### 3.1.2.2 Analysis

The analyses of ground water samples included the following (Table 3):

- pH, specific conductance, and alkalinity
- Total phenolics
- Nitrates
- Total and dissolved lead
- Priority pollutant VOCs
- Polychlorinated biphenyls (PCBs).





Although the approved Work Plan did not require an expanded quality assurance (QA) data deliverables package for this sampling, Armco agreed to request an expanded data package from the analytical laboratory to provide EPA with data sufficient to assess the quality of the analytical results. The analytical laboratory (WAL) provided a QA data package for the March 1991 sampling. Also included in this data package was the analysis of a spike sample prepared by EPA, which Armco agreed to submit for analysis of total lead, PCB, and VOC.

The field blank samples were submitted for a similar parameter list as the well samples but, due to an omission, no rinsate blank was submitted for VOC analysis during the March 1991 sampling. The trip blank submitted at the time of collection of these samples has provided adequate quality control to ensure no significant incidental contamination of the samples. In accordance with requirements, a second replicate sample was collected at Well MW-12 for VOC analysis.

### 3.1.3 Aquifer Testing

Remcor conducted aquifer testing to evaluate the hydraulic conductivity of the water-bearing zones. Tests were conducted at Monitoring Wells MW-1, MW-1D, MW-3, MW-3A, MW-3D, MW-10, MW-11, and MW-12.



The rising head tests were performed by rapidly removing a known volume of water from the well and then measuring the recovering water level. Because the aquifer was expected to have a relatively high hydraulic conductivity, the method for conducting the tests was as follows:

- Measuring the static water level
- Rapidly removing two one-liter bails from the well
- Starting the stopwatch at the instant the second bail was removed
- Measuring water levels with an electronic water level indicator with respect to time until the water level returned to the static level
- Recording water level and time with an audio tape recorder
- Transcribing test data into the field notebook.

When rising head permeability tests were conducted at the deep wells, the field data were recorded by an automatic data logger and pressure transducer. These data were subsequently tabulated and graphical summaries of drawdown versus time were compiled. The calculations are provided in Appendix H. Table H-1 summarizes the developed hydraulic conductivity data.

### 3.2 INVESTIGATION RESULTS

The following sections present the findings of Remcor's ground water investigation.



### 3.2.1 Subsurface Conditions

#### 3.2.1.1 Site Geology

The UWR plant site is underlain by Quaternary Alluvium of the Blue River. Soils consist of moist to saturated brown interbedded clayey silt and silty clay with minor amounts of fine sand. These soils extend to a depth of approximately 39 feet below ground surface (ft-bgs) in Wells MW-1D and MW-3D. The silt and clay sequence generally coarsens with depth, resulting in a more permeable zone at approximately 20 ft-bgs.

An approximate 3- to 4-foot thick damp, stiff silty clay was encountered beneath the saturated interbedded clayey silt and silty clay in the deep wells drilled at the site. This zone appears to be one of reduced permeability.

An olive green silty gravel and silty sand sequence lies beneath the stiff brown silty clay, and above bedrock. The silty gravel and sand extends from approximately 43 ft-bgs to 63 ft-bgs in the MW-1D and MW-3D locations. This material represents the basal unconsolidated material encountered at UWR site. The gravel and sand sequence would be expected to have a relatively higher permeability than the overlying finer materials; however the wide distribution of grain sizes encountered (i.e., poor sorting) may result in a low permeability.



The unconsolidated deposits at site are underlain by a claystone or shale. Remcor logged medium to dark gray claystone at a depth of approximately 63 ft-bgs (688 feet above mean sea level [ft-msl]) in MW-1D and MW-3D. The upper zone of the shale weathers to claystone.

#### 3.2.1.2 Site Ground Water

Shallow ground water is located within soft silt and silt-sand units. Ground water was typically encountered between 15 and 20 ft-bgs; however, water levels in some wells located at the southern limits of the site rose as high as 7 ft-bgs. Overlying finer deposits tend to be aquitard materials, confining the soft silt and silt sand aquifer in places. Rising head tests indicated an average (geometric mean) hydraulic conductivity of the shallow aquifer of  $7.25 \times 10^{-4}$  centimeter per second (cm/sec).

The general direction of ground water flow in the shallow zone is toward the north-northeast, with discharge to the Blue River. The average hydraulic gradient at the UWR site is in the range of 0.01 to 0.02 foot per foot (ft/ft). In the North End area, hydraulic gradients estimated from water levels in wells and the stage of the Blue River are in the range of 0.011 to 0.047 ft/ft. These gradients represent discharge zone conditions and tend to be higher than the average gradients across the UWR plant site. Appendix I presents ground water elevation data collected from January 1988 through May 1991. Ground water elevations varied





over the period, but hydraulic flow directions and gradients remained generally consistent.

A coarser-grained, lower portion of the aquifer is located 3 to 4 feet beneath the finer shallow water bearing zone (approximately 43 ft-bgs) and above bedrock (approximately 63 ft-bgs). This aquifer consists primarily of olive green silty sand and silty gravel. Rising head permeability tests conducted in deep wells MW-1D and MW-3D indicated an average (geometric mean) hydraulic conductivity for the deep zone of  $1.81 \times 10^{-3}$  cm/sec.

The potentiometric heads in Wells MW-1D and MW-3D were found to be higher than the potentiometric heads in nearby shallow Wells MW-1 and MW-3. Ground water from the deeper zone appears to discharge to the shallow zone with an upward vertical gradient of approximately 0.06 to 0.07 ft/ft.

### 3.2.2 Ground Water Sampling Results

In March and May 1991, ground water samples were collected at all wells at the UWR site. In May 1991, a ground water sample was also collected at Well MW-2A, installed to replace Well MW-2. The data for this sampling are summarized in Tables 4 and 5, and laboratory reports are provided in Appendix J. Historical sampling data for the period January 1988 through November 1990 are summarized in Appendix K.



### 3.3 CONCLUSIONS

The ground water investigation has shown that the unconsolidated aquifer at the former North End disposal site is comprised of an upper and lower zone, each having a slightly different hydraulic conductivity. Piezometric levels in cluster wells indicate an upward vertical gradient. Ground water sampling of the cluster wells also indicates that the ground water chemistry of the deep zone is dissimilar to that of the shallow zone with respect to VOCs. Because the VOCs detected at the former North End disposal site are generally denser than water, the absence of VOCs in the deep wells indicates that the alluvium acts as two separate aquifers with shallow ground water discharging to the Blue River.

Ground water sampling at the site has detected VOCs at wells located near the northern and western limits of the site. These concentrations were detected in wells located upgradient of the former North End disposal area so that the North End is not considered a source of VOCs in ground water. The flux of total VOCs to the Blue River was calculated to be 0.00596 pound per day. The average flow in the Blue River is approximately 200 cubic feet per second, so that this flux would contribute a total VOC concentration in the Blue River of 0.0055 microgram per liter. This concentration is well below any threshold concentration of concern for the VOCs observed in ground water at the site. These VOCs do not result in any measurable risk to water quality in the Blue River or any downstream user of this water.



Total lead concentrations are present at varying concentrations in site wells. Flux calculations were not made for lead because dissolved lead (i.e., the measure of lead mobile through ground water transport) was typically below the maximum contaminant level (MCL) at the site. Any downstream transport would only further reduce the lead level below the MCL.

The conclusion of this investigation is that the chemical condition of site ground water does not indicate an environmental concern.

#### 3.4 RECOMMENDATIONS

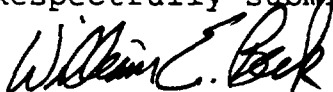
Based on the results of this investigation, no action for ground water remediation is warranted. The current ground water quality poses no unacceptable threat to public health or the environment, and concentrations in ground water are not increasing. The known source of potential contamination has been removed from the former North End disposal area.



#### 4.0 CERTIFICATION

Remcor has completed all work described in this report to satisfy the requirements of the ACO between Armco and EPA Region VII for the removal action at the former North End disposal area at the UWR plant site. As described herein, the execution of this work has been in compliance with the approved Work Plan, both in detail and intent. It is Remcor's best professional opinion that the objectives defined in the approved Work Plan have been successfully fulfilled.

Respectfully submitted,



William E. Beck  
Project Manager



Leo M. Brausch, P.E.  
Vice President and Chief  
Operating Officer





TABLE 1

SUMMARY OF REMOVED WASTES (1)

DESCRIPTION	QUANTITY	UNITS	DISPOSAL SITE
Total fill excavated	26,493 36,923	cu yds. tons	--
Hazardous waste	12,687 17,205	cu yds. tons	Peoria Disposal
Industrial waste	10,680 13,350	cu yds. tons	Southeast Disposal
Ferrous metal scrap	2,126 4,478	cu yds. tons	Metal reclaimer (contractor to Armco)
Large concrete rubble	1,000 1,890	cu yds. tons	On-site riprap

(1) For waste shipment inventories, see Appendix D.



TABLE 2

## FINAL CONFIRMATORY SAMPLE RESULTS (1)

SAMPLE NO. (2)	SECTION	GRID	DEPTH (3) (feet)	TOTAL LEAD (mg/kg)
01-02-163-BT	1	1A	2.0 to 2.5	19
01-02-164-BT	1	1A	2.5 to 3.0	10
01-02-165-BT	1	1B	2.0 to 2.5	17
01-02-166-BT	1	1B	2.5 to 3.0	27
01-02-167-BT	1	1C	2.0 to 2.5	16
01-02-168-BT	1	1C	2.5 to 3.0	32
01-06-028-BT	1	1D, 1E	6.0 to 6.5	17
(01-06-001-SC)				
01-06-029-BT	1	1D, 1E	6.5 to 7.0	232
(01-06-002-SC)				
02-07-175-BT	2	2A	7.0 to 7.5	14
02-07-176-BT	2	2A	7.5 to 8.0	15
02-07-177-BT	2	2B	7.0 to 7.5	12
02-07-178-BT	2	2B	7.5 to 8.0	17
02-08-179-BT	2	2C	7.0 to 7.5	13
02-08-180-BT	2	2C	7.5 to 8.0	12
02-07-030-BT	2	2D	7.0 to 7.5	16
(02-06-003-SC)				
02-07-031-BT	2	2D	7.5 to 8.0	16
(02-06-004-SC)				
02-06-022-BT	2	2E	6.0 to 6.5	48
(01-05-001-SC)				
02-06-023-BT	2	2E	6.5 to 7.0	24
(01-05-002-SC)				
03-08-181-BT	3	3A	7.0 to 7.5	65
03-08-182-BT	3	3A	7.5 to 8.0	13
03-09-185-BT	3	3B	9.0 to 9.5	17
03-09-186-BT	3	3B	9.5 to 10.0	14
03-10-233-BT	3	3C	10.0 to 10.5	71
03-10-234-BT	3	3C	10.5 to 11.0	80

See footnotes at end of table.



TABLE 2  
(CONTINUED)

PAGE 2

SAMPLE NO. (2)	SECTION	GRID	DEPTH (3) (feet)	TOTAL LEAD (mg/kg)
03-14-221-BT	3	3D	14.0 to 14.5	< 3
03-14-222-BT	3	3D	14.0 to 14.5	23
03-07-032-BT (03-00-005-SC)	3	3E	7.0 to 7.5	140
03-07-033-BT (03-00-006-SC)	3	3E	7.5 to 8.0	16
03-10-215-BT	3	3F	10.0 to 10.5	73
03-10-216-BT	3	3F	10.5 to 11.0	138
04-08-191-BT	4	4A	8.0 to 8.5	14
04-08-192-BT	4	4A	8.5 to 9.0	16
04-08-193-BT	4	4B	8.0 to 8.5	21
04-08-194-BT	4	4B	8.5 to 9.0	17
04-08-195-BT	4	4C	8.0 to 8.5	24
04-08-196-BT	4	4C	8.5 to 9.0	9
04-07-040-BT (04-06-005-SC)	4	4D	6.5 to 7.0	42
04-07-041-BT (04-06-006-SC)	4	4D	7.0 to 7.5	29
04-07-046-BT	4	4E	6.5 to 7.0	80
04-07-047-BT	4	4E	7.0 to 7.5	24
04-01-169-BT	4	4F	1.0 to 1.5	11
04-01-170-BT	4	4F	1.5 to 2.0	14
05-08-198-BT	5	5A	8.0 to 8.5	15
05-08-199-BT	5	5A	8.5 to 9.0	40
05-08-201-BT	5	5B	8.0 to 8.5	75
05-08-202-BT	5	5B	8.5 to 9.0	4
05-09-237-BT	5	5C	9.0 to 9.5	78
05-09-238-BT	5	5C	9.5 to 10.0	78

See footnotes at end of table.



TABLE 2  
(CONTINUED)

PAGE 3

SAMPLE NO. (2)	SECTION	GRID	DEPTH (3) (feet)	TOTAL LEAD (mg/kg)
05-07-042-BT (05-06-003-BT)	5	5D	7.0 to 7.5	30
05-07-043-BT (05-06-004-BT)	5	5D	7.5 to 8.0	15
05-07-048-BT	5	5E	7.0 to 7.5	28
05-07-049-BT	5	5E	7.5 to 8.0	24
05-12-189-BT	5	5F	2.0 to 2.5	90
05-12-190-BT	5	5F	2.5 to 3.0	26
06-08-207-BT	6	6A	8.0 to 8.5	14
06-08-208-BT	6	6A	8.5 to 9.0	10
06-08-209-BT	6	6B	8.0 to 8.5	16
06-08-210-BT	6	6B	8.5 to 9.0	9
06-08-211-BT	6	6C	8.0 to 8.5	16
06-08-212-BT	6	6C	8.5 to 9.0	23
06-08-227-BT	6	6D	9.0 to 9.5	24
06-08-228-BT	6	6D	9.5 to 10.0	13
06-14-229-BT	6	6E	10.0 to 10.5	17
06-14-230-BT	6	6E	10.5 to 11.0	11
06-01-187-BT	6	6F	1.0 to 1.5	23
06-01-188-BT	6	6F	1.5 to 2.0	27
07-09-135-BT	7	7A	10.0 to 10.5	13
07-09-136-BT	7	7A	10.5 to 11.0	13
07-10-151-BT	7	7B	10.0 to 10.5	37
07-10-152-BT	7	7B	10.5 to 11.0	35
07-09-137-BT	7	7C	9.0 to 9.5	31
07-09-138-BT	7	7C	9.5 to 10.0	21
07-10-099-BT	7	7D	10.0 to 10.5	33
07-10-100-BT	7	7D	10.5 to 11.0	24

See footnotes at end of table.





TABLE 2  
(CONTINUED)

PAGE 4

SAMPLE NO. (2)	SECTION	GRID	DEPTH (3) (feet)	TOTAL LEAD (mg/kg)
07-07-064-BT	7	7E	7.0 to 7.5	15
07-07-065-BT	7	7E	7.5 to 8.0	30
07-06-066-BT	7	7F	6.0 to 6.5	63
07-06-067-BT	7	7F	6.5 to 7.0	62
08-06-114-BT	8	8B	6.0 to 6.5	22
08-06-115-BT	8	8B	6.5 to 7.0	18
08-06-116-BT	8	8C	6.0 to 6.5	50
08-06-117-BT	8	8C	6.5 to 7.0	51
08-10-095-BT	8	8D	10.0 to 10.5	39
08-10-096-BT	8	8D	10.5 to 11.0	34
08-07-068-BT	8	8E	7.0 to 7.5	177
08-07-069-BT	8	8E	7.5 to 8.0	202
08-02-153-BT	8	8F	2.0 to 2.5	235
08-06-154-BT	8	8F	2.5 to 3.0	83
09-05-109-BT	9	9A	5.0 to 5.5	8
09-05-110-BT	9	9A	5.5 to 6.0	11
09-06-111-BT	9	9B	6.0 to 6.5	35
09-06-081-BT	9	9C	6.0 to 6.5	43
09-06-082-BT	9	9C	6.5 to 7.0	27
09-06-083-BT	9	9D	6.0 to 6.5	81
09-06-084-BT	9	9D	6.5 to 7.0	120
09-06-091-BT	9	9E	6.0 to 6.5	62
09-06-092-BT	9	9E	6.5 to 7.0	56
09-21-219-BT	9	9F	1.0 to 1.5	190
09-21-220-BT	9	9F	1.5 to 2.0	201

See footnotes at end of table.



TABLE 2  
(CONTINUED)

PAGE 5

SAMPLE NO. (2)	SECTION	GRID	DEPTH (3) (feet)	TOTAL LEAD (mg/kg)
10-07-010-BT (10-07-001-SC)	10	10A	7.0 to 7.5	91
10-07-011-BT (10-07-002-SC)	10	10A	7.5 to 8.0	46
10-09-018-BT (11-09-016-SC)	10	10B	9.0 to 9.5	57
10-09-019-BT (11-09-017-SC)	10	10B	9.5 to 10.0	41
10-11-235-BT	10	10C	11.0 to 11.5	71
10-11-236-BT	10	10C	11.5 to 12.0	62
10-06-078-BT	10	10D	7.0 to 7.5	140
10-06-079-BT	10	10D	7.5 to 8.0	126
10-06-129-BT	10	10E	6.0 to 6.5	51
10-06-130-BT	10	10E	6.5 to 7.0	38
10-02-157-BT	10	10F	2.0 to 2.5	162
10-02-158-BT	10	10F	2.5 to 3.0	89
11-08-005-EM	11	11A	8.0 to 8.5	211
11-08-006-EM	11	11A	8.5 to 9.0	82
11-08-014-BT	11	11B	8.0 to 8.5	29
11-08-015-BT	11	11B	8.5 to 9.0	25
11-05-058-BT	11	11C	5.0 to 5.5	149
11-05-059-BT	11	11C	5.5 to 6.0	119
11-06-085-BT	11	11D	6.0 to 6.5	12
11-06-086-BT	11	11D	6.5 to 7.0	28
11-06-087-BT	11	11E	6.0 to 6.5	129
11-06-088-BT	11	11E	6.5 to 7.0	107
11-21-223-BT	11	11F	1.0 to 1.5	71
11-21-224-BT	11	11F	1.5 to 2.0	186
12-02-240-BT	12	12B	1.0 to 1.5	155

See footnotes at end of table.



TABLE 2  
(CONTINUED)

PAGE 6

SAMPLE NO. (2)	SECTION	GRID	DEPTH (3) (feet)	TOTAL LEAD (mg/kg)
12-05-060-BT	12	12C,12D	5.0 to 5.5	36
12-05-061-BT	12	12C,12D	5.5 to 6.0	16
12-21-217-BT	12	12E	1.0 to 1.5	221
12-21-218-BT	12	12E	1.5 to 2.0	187
12-21-225-BT	12	12F	1.0 to 1.5	153
12-21-226-BT	12	12F	1.5 to 2.0	97

- (1) For diagram of confirmatory sample locations, see Figure 5. Chain-of-custody forms and laboratory analysis reports are provided in Volume II, Appendices B and C, respectively.
- (2) Sample numbers in parentheses are former numbers that were subsequently revised.
- (3) Depths are referenced to the ground surface before the start of excavation.



TABLE 3

ANALYTICAL METHODS REFERENCE  
GROUND WATER SAMPLES

PARAMETER	CONTAINER TYPE (1)	PRESERVATIVE	HOLDING TIME	ANALYTICAL METHOD (2)	DETECTION LIMIT
pH	500 or 1,000-ml P	4°C	Immediately	9040	±0.01 pH unit
Specific Conductance	1,000-ml P	4°C	28 days	9050	1 µmho/cm
Alkalinity	1,000-ml P	4°C	14 days	310.2	1 mg/l CaCO <sub>3</sub>
Phenolics	1,000-ml G	4°C; H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days	9066	0.01 mg/l
Nitrate	250-ml P	4°C; H <sub>2</sub> SO <sub>4</sub> to pH <2	14 days	9200	1 mg/l
Total Lead	250-ml P	HNO <sub>3</sub> to pH <2	6 months	7420 or 6010	0.003 mg/l
Dissolved Lead	250-ml P	Filter 0.45 micron; HNO <sub>3</sub> to pH <2	6 months	7420 or 6010	0.003 mg/l

See footnotes at end of table.





TABLE 3  
(Continued)

PARAMETER	CONTAINER TYPE (1)	PRESERVATIVE	HOLDING TIME	ANALYTICAL METHOD (2)	DETECTION LIMIT
Priority Pollutant Volatile Organics	Two 40-ml G vials	4°C; seal with- out air space	14 days	8240	5 to 250 µg/l
Polychlorinated Biphenyls	1,000-ml P	4°C	40 days after extraction	8080	0.001 mg/l

(1) "P" indicates plastic; "G" indicates glass.

(2) All methods, except that for alkalinity, reference U.S. Environmental Protection Agency, 1986 SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods." The alkalinity method reference is U.S. Environmental Protection Agency, 1979, "Methods for Chemical Analysis of Water and Wastes."

(3) Method 1310 is the extraction method.



TABLE 4  
RESULTS OF GROUND WATER ANALYSES  
MARCH 13, 1991

PARAMETER	UNITS	RAU-MW -001-15	RAU-MW -001D-15	RAU-MW -002-15	RAU-MW -003-15	RAU-MW -003D-15
WATER LEVEL	ft-msl	733.85	736.66	733.16	733.86	736.60
<u>GENERAL CHEMISTRY</u>						
pH	s.u.	6.4	7.1	6.1	6.5	7.0
SPECIFIC CONDUCTANCE	µmho/cm	1500	740	3100	850	540
ACIDITY AS CaCO <sub>3</sub>	mg/l	<1.0	16	1.5	<1.0	<1.0
ALKALINITY AS CaCO <sub>3</sub>	mg/l	470	430	240	300	280
NITRATES AS NO <sub>3</sub> -N	mg/l	0.29	0.11	0.24	0.30	0.13
PHENOLICS	mg/l	<0.005	<0.005	0.009	0.008	0.006
TOTAL LEAD	mg/l	0.058	0.024	0.049	0.063	0.010
DISSOLVED LEAD	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
POLYCHLORINATED BIPHENYL	µg/l	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOLATILE ORGANIC COMPOUNDS</u>						
ACROLEIN	µg/l	<50	<50	<50	<125	<50
ACRYLONITRILE	µg/l	<50	<50	<50	<125	<50
BENZENE	µg/l	<5	<5	<5	<12	<5
BROMODICHLOROMETHANE	µg/l	<5	<5	<5	<12	<5
BROMOFORM	µg/l	<5	<5	<5	<12	<5
BROMOMETHANE	µg/l	<10	<10	<10	<25	<10
CARBON TETRACHLORIDE	µg/l	<5	<5	<5	<12	<5
CHLOROBENZENE	µg/l	<5	<5	<5	<12	<5
CHLOROETHANE	µg/l	160	<10	<10	<25	<10
2-CHLOROETHYL VINYL ETHER	µg/l	<10	<10	<10	<25	<10
CHLOROFORM	µg/l	<5	<5	<5	<12	<5
CHLOROMETHANE	µg/l	<10	<10	<10	<25	<10
DIBROMOCHLOROMETHANE	µg/l	<5	<5	<5	<12	<5
1,2-DICHLOROBENZENE	µg/l	<5	<5	<5	<12	<5
1,3-DICHLOROBENZENE	µg/l	<5	<5	<5	<12	<5
1,4-DICHLOROBENZENE	µg/l	<5	<5	<5	<12	<5
1,1-DICHLOROETHANE	µg/l	200	<5	8	35	<5
1,2-DICHLOROETHANE	µg/l	<5	<5	<5	<12	<5
1,1-DICHLOROETHENE	µg/l	29	<5	<5	270	<5
1,2-DICHLOROETHENE	µg/l	2	<5	<5	6	<5
1,2-DICHLOROPROPANE	µg/l	<5	<5	<5	<12	<5
cis-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<12	<5
trans-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<12	<5
ETHYLBENZENE	µg/l	<5	<5	<5	<12	<5
METHYLENE CHLORIDE	µg/l	<10	<10	<10	<25	<10
1,1,2,2-TETRACHLOROETHANE	µg/l	<5	<5	<5	<12	<5
TETRACHLOROETHENE	µg/l	<5	<5	<5	6	<5
TOLUENE	µg/l	<5	<5	<5	<12	<5
1,1,1-TRICHLOROETHANE	µg/l	38	<5	<5	67	<5
1,1,2-TRICHLOROETHANE	µg/l	<5	<5	<5	<12	<5
TRICHLOROETHENE	µg/l	<5	<5	<5	<12	<5
TRICHLOROFLOUROMETHANE	µg/l	<5	<5	<5	<12	<5
VINYL CHLORIDE	µg/l	23	<10	<10	16	<10
TOTAL VOCs	µg/l	452	0	8	400	0



TABLE 4  
(CONTINUED)

PARAMETER	UNITS	RAU-MW -003A-15	RAU-MW -004-15	RAU-MW -005-15	RAU-MW -006-15	RAU-MW 006R-15
WATER LEVEL	ft-msl	734.69	739.36	743.69	743.91	REPLICATE
<u>GENERAL CHEMISTRY</u>						
pH	s.u.	6.2	6.6	6.0	6.3	6.4
SPECIFIC CONDUCTANCE	umho/cm	600	2900	1600	960	950
ACIDITY AS CaCO3	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0
ALKALINITY AS CaCO3	mg/l	140	450	110	140	140
NITRATES AS NO3-N	mg/l	0.16	1.00	0.18	0.19	0.21
PHENOLICS	mg/l	0.007	0.006	0.006	<0.005	<0.005
TOTAL LEAD	mg/l	0.011	0.058	0.026	0.015	0.028
DISSOLVED LEAD	mg/l	<0.003	0.020	<0.003	<0.003	<0.003
POLYCHLORINATED BIPHENYL	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOLATILE ORGANIC COMPOUNDS</u>						
ACROLEIN	ug/l	<50	<50	<50	<50	<50
ACRYLONITRILE	ug/l	<50	<50	<50	<50	<50
BENZENE	ug/l	<5	<5	<5	<5	<5
BROMODICHLOROMETHANE	ug/l	<5	<5	<5	<5	<5
BROMOFORM	ug/l	<5	<5	<5	<5	<5
BROMOMETHANE	ug/l	<10	<10	<10	<10	<10
CARBON TETRACHLORIDE	ug/l	<5	<5	<5	<5	<5
CHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
CHLOROETHANE	ug/l	<10	<10	<10	<10	<10
2-CHLOROETHYL VINYL ETHER	ug/l	<10	<10	<10	<10	<10
CHLOROFORM	ug/l	<5	<5	<5	<5	<5
CHLOROMETHANE	ug/l	20	<10	<10	<10	<10
DIBROMOCHLOROMETHANE	ug/l	<5	<5	<5	<5	<5
1,2-DICHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
1,3-DICHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
1,4-DICHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
1,1-DICHLOROETHANE	ug/l	9	6	<5	<5	<5
1,2-DICHLOROETHANE	ug/l	<5	<5	<5	<5	<5
1,1-DICHLOROETHENE	ug/l	120	29	<5	<5	<5
1,2-DICHLOROETHENE	ug/l	<5	<5	<5	<5	<5
1,2-DICHLOROPROPANE	ug/l	<5	<5	<5	<5	<5
cis-1,3-DICHLOROPROPANE	ug/l	<5	<5	<5	<5	<5
trans-1,3-DICHLOROPROPANE	ug/l	<5	<5	<5	<5	<5
ETHYLBENZENE	ug/l	<5	<5	<5	<5	<5
METHYLENE CHLORIDE	ug/l	<10	<10	<10	<10	<10
1,1,2,2-TETRACHLOROETHANE	ug/l	<5	<5	<5	<5	<5
TETRACHLOROETHENE	ug/l	28	<5	<5	<5	<5
TOLUENE	ug/l	<5	<5	<5	<5	<5
1,1,1-TRICHLOROETHANE	ug/l	37	17	<5	<5	<5
1,1,2-TRICHLOROETHANE	ug/l	<5	<5	<5	<5	<5
TRICHLOROETHENE	ug/l	3	<5	<5	<5	<5
TRICHLOROFLOUROMETHANE	ug/l	<5	<5	<5	<5	<5
VINYL CHLORIDE	ug/l	<10	<10	<10	<10	<10
TOTAL VOCs	ug/l	217	52	0	0	0



TABLE 4  
(CONTINUED)

PARAMETER	UNITS	RAU-MW -007-15	RAU-MW -008-15	RAU-MW -009-15	RAU-MW -010-15	RAU-MW -011-15
WATER LEVEL	ft-msl	746.43	738.31	743.91	732.83	733.08
<u>GENERAL CHEMISTRY</u>						
pH	s.u.	6.3	6.9	6.2	5.9	6.6
SPECIFIC CONDUCTANCE	µmho/cm	910	940	510	2900	960
ACIDITY AS CaCO <sub>3</sub>	mg/l	<1.0	<1.0	<1.0	8	<1.0
ALKALINITY AS CaCO <sub>3</sub>	mg/l	83	460	68	170	200
NITRATES AS NO <sub>3</sub> -N	mg/l	1.30	0.17	<0.10	0.44	0.26
PHENOLICS	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005
TOTAL LEAD	mg/l	0.009	0.083	0.015	0.066	0.030
DISSOLVED LEAD	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
POLYCHLORINATED BIPHENYL	µg/l	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOLATILE ORGANIC COMPOUNDS</u>						
ACROLEIN	µg/l	<50	<50	<50	<250	<50
ACRYLONITRILE	µg/l	<50	<50	<50	<250	<50
BENZENE	µg/l	<5	<5	<5	<25	<5
BROMODICHLOROMETHANE	µg/l	<5	<5	<5	<25	<5
BROMOFORM	µg/l	<5	<5	<5	<25	<5
BROMOMETHANE	µg/l	<10	<10	<10	<50	<10
CARBON TETRACHLORIDE	µg/l	<5	<5	<5	<25	<5
CHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
CHLOROETHANE	µg/l	<10	<10	<10	37	<10
2-CHLOROETHYL VINYL ETHER	µg/l	<10	<10	<10	<50	<10
CHLOROFORM	µg/l	<5	<5	<5	<25	<5
CHLOROMETHANE	µg/l	<10	<10	<10	<50	<10
DIBROMOCHLOROMETHANE	µg/l	<5	<5	<5	<25	<5
1,2-DICHLOROBENZENE	µg/l	<5	<5	15	<25	<5
1,3-DICHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
1,4-DICHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
1,1-DICHLOROETHANE	µg/l	<5	<5	<5	580	8
1,2-DICHLOROETHANE	µg/l	<5	<5	<5	<25	<5
1,1-DICHLOROETHENE	µg/l	<5	<5	<5	83	<5
1,2-DICHLOROETHENE	µg/l	<5	<5	3	23	<5
1,2-DICHLOROPROPANE	µg/l	<5	<5	<5	<25	<5
cis-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<25	<5
trans-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<25	<5
ETHYLBENZENE	µg/l	<5	<5	<5	<25	<5
METHYLENE CHLORIDE	µg/l	<10	<10	<10	<50	<10
1,1,2,2-TETRACHLOROETHANE	µg/l	<5	<5	<5	<25	<5
TETRACHLOROETHENE	µg/l	<5	<5	<5	<25	<5
TOLUENE	µg/l	<5	<5	<5	<25	<5
1,1,1-TRICHLOROETHANE	µg/l	<5	<5	<5	210	<5
1,1,2-TRICHLOROETHANE	µg/l	<5	<5	<5	<25	<5
TRICHLOROETHENE	µg/l	<5	<5	13	<25	<5
TRICHLOROFLOUROMETHANE	µg/l	<5	<5	<5	<25	<5
VINYL CHLORIDE	µg/l	<10	<10	<10	34	<10
TOTAL VOCs	µg/l	0	0	31	967	8





TABLE 4  
(CONTINUED)

PARAMETER	UNITS	RAU-MW -012-15	RAU-MW -012R-15	RAU-MW -000-15	TRIP BLANK
WATER LEVEL	ft-msl	733.47	REPLICATE	BLANK	
<u>GENERAL CHEMISTRY</u>					
pH	s.u.	6.6		6.6	
SPECIFIC CONDUCTANCE	µmho/cm	1600		100	
ACIDITY AS CaCO <sub>3</sub>	mg/l	<1.0		11	
ALKALINITY AS CaCO <sub>3</sub>	mg/l	680		7.8	
NITRATES AS NO <sub>3</sub> -N	mg/l	0.43		0.16	
PHENOLICS	mg/l	<0.005		<0.005	
TOTAL LEAD	mg/l	0.100		<0.003	
DISSOLVED LEAD	mg/l	<0.003		<0.003	
POLYCHLORINATED BIPHENYL	µg/l	<1.0		<1.0	
<u>VOLATILE ORGANIC COMPOUNDS</u>					
ACROLEIN	µg/l	<50	<50		<50
ACRYLONITRILE	µg/l	<50	<50		<50
BENZENE	µg/l	<5	<5		<5
BROMODICHLOROMETHANE	µg/l	<5	<5		<5
BROMOFORM	µg/l	<5	<5		<5
BROMOMETHANE	µg/l	<10	<10		<10
CARBON TETRACHLORIDE	µg/l	<5	<5		<5
CHLOROBENZENE	µg/l	<5	<5		<5
CHLOROETHANE	µg/l	<10	<10		<10
2-CHLOROETHYL VINYL ETHER	µg/l	<10	<10		<10
CHLOROFORM	µg/l	<5	<5		<5
CHLOROMETHANE	µg/l	<10	<10		<10
DIBROMOCHLOROMETHANE	µg/l	<5	<5		<5
1,2-DICHLOROBENZENE	µg/l	<5	<5		<5
1,3-DICHLOROBENZENE	µg/l	<5	<5		<5
1,4-DICHLOROBENZENE	µg/l	<5	<5		<5
1,1-DICHLOROETHANE	µg/l	120	120		<5
1,2-DICHLOROETHANE	µg/l	<5	<5		<5
1,1-DICHLOROETHENE	µg/l	<5	<5		<5
1,2-DICHLOROETHENE	µg/l	9	9		<5
1,2-DICHLOROPROPANE	µg/l	<5	<5		<5
cis-1,3-DICHLOROPROPANE	µg/l	<5	<5		<5
trans-1,3-DICHLOROPROPANE	µg/l	<5	<5		<5
ETHYLBENZENE	µg/l	<5	<5		<5
METHYLENE CHLORIDE	µg/l	<10	<10		<10
1,1,2,2-TETRACHLOROETHANE	µg/l	<5	<5		<5
TETRACHLOROETHENE	µg/l	<5	<5		<5
TOLUENE	µg/l	<5	<5		<5
1,1,1-TRICHLOROETHANE	µg/l	<5	<5		<5
1,1,2-TRICHLOROETHANE	µg/l	<5	<5		<5
TRICHLOROETHENE	µg/l	<5	<5		<5
TRICHLOROFLOUROMETHANE	µg/l	<5	<5		<5
VINYL CHLORIDE	µg/l	8	10		<10
TOTAL VOCs	µg/l	137	139		0



TABLE 5  
RESULTS OF GROUND WATER ANALYSES  
MAY 3, 1991

PARAMETER	UNITS	RAU-MW -001-16	RAU-MW -001D-16	RAU-MW -002A-16	RAU-MW -003-16	RAU-MW -003D-16
WATER LEVEL	ft-msl	734.68	737.61		734.92	737.21
<u>GENERAL CHEMISTRY</u>						
pH	s.u.	6.4	6.8	6.0	6.6	6.9
SPECIFIC CONDUCTANCE	umho/cm	1500	700	2900	780	580
ALKALINITY AS CaCO3	mg/l	460	410	290	330	330
NITRATES AS NO3-N	mg/l	0.32	0.20	0.40	0.40	0.14
PHENOLICS	mg/l	<0.006	<0.006	<0.006	<0.006	<0.006
TOTAL LEAD	mg/l	0.130	0.029	0.120	0.130	0.130
DISSOLVED LEAD	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
POLYCHLORINATED BIPHENYLS	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOLATILE ORGANIC COMPOUNDS</u>						
ACROLEIN	ug/l	<50	<50	<50	<50	<50
ACRYLONITRILE	ug/l	<50	<50	<50	<50	<50
BENZENE	ug/l	<5	<5	<5	<5	<5
BROMODICHLOROMETHANE	ug/l	<5	<5	<5	<5	<5
BROMOFORM	ug/l	<5	<5	<5	<5	<5
BROMOMETHANE	ug/l	<10	<10	<10	<10	<10
CARBON TETRACHLORIDE	ug/l	<5	<5	<5	<5	<5
CHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
CHLOROETHANE	ug/l	180	<10	<10	<10	<10
2-CHLOROETHYL VINYL ETHER	ug/l	<10	<10	<10	<10	<10
CHLOROFORM	ug/l	<5	<5	<5	<5	<5
CHLOROMETHANE	ug/l	<10	<10	<10	<10	<10
DIBROMOCHLOROMETHANE	ug/l	<5	<5	<5	<5	<5
1,2-DICHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
1,3-DICHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
1,4-DICHLOROBENZENE	ug/l	<5	<5	<5	<5	<5
1,1-DICHLOROETHANE	ug/l	317	<5	<5	44	<5
1,2-DICHLOROETHANE	ug/l	<5	<5	<5	<5	<5
1,1-DICHLOROETHENE	ug/l	86	<5	4.8 (J)	410	<5
1,2-DICHLOROETHENE	ug/l	<5	<5	<5	<5	<5
1,2-DICHLOROPROPANE	ug/l	<5	<5	<5	<5	<5
cis-1,3-DICHLOROPROPANE	ug/l	<5	<5	<5	<5	<5
trans-1,3-DICHLOROPROPANE	ug/l	<5	<5	<5	<5	<5
ETHYLBENZENE	ug/l	<5	<5	<5	<5	<5
METHYLENE CHLORIDE	ug/l	<10	<10	<10	<10	<10
1,1,2,2-TETRACHLOROETHANE	ug/l	<5	<5	<5	<5	<5
TETRACHLOROETHENE	ug/l	<5	<5	<5	<5	<5
TOLUENE	ug/l	<5	<5	<5	<5	<5
1,1,1-TRICHLOROETHANE	ug/l	85	<5	<5	98	<5
1,1,2-TRICHLOROETHANE	ug/l	<5	<5	<5	<5	<5
TRICHLOROETHENE	ug/l	<5	<5	<5	<5	<5
TRICHLOROFLOUROMETHANE	ug/l	<5	<5	<5	<5	<5
VINYL CHLORIDE	ug/l	<10	<10	<10	<10	<10
TOTAL VOCs	ug/l	668	0	5	552	0



TABLE 5  
(CONTINUED)

PARAMETER	UNITS	RAU-MW -003A-16	RAU-MW -004-16	RAU-MW -005-16	RAU-MW -006-16	RAU-MW 006R-16
WATER LEVEL	ft-msl	736.38	738.91	743.64	744.65	REPLICATE
<u>GENERAL CHEMISTRY</u>						
pH	s.u.	6.1	6.3	5.9	6.2	6.1
SPECIFIC CONDUCTANCE	µmho/cm	500	2800	1600	970	980
ALKALINITY AS CaCO <sub>3</sub>	mg/l	120	440	100	110	120
NITRATES AS NO <sub>3</sub> -N	mg/l	0.78	0.26	0.16	0.20	0.44
PHENOLICS	mg/l	<0.006	0.008		0.006	<0.005
TOTAL LEAD	mg/l	0.014	0.400	0.037	0.040	0.086
DISSOLVED LEAD	mg/l	<0.003	0.013	<0.003	<0.003	<0.003
POLYCHLORINATED BIPHENYLS	µg/l	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOLATILE ORGANIC COMPOUNDS</u>						
ACROLEIN	µg/l	<50	<50	<50	<50	<50
ACRYLONITRILE	µg/l	<50	<50	<50	<50	<50
BENZENE	µg/l	<5	<5	<5	<5	<5
BROMODICHLOROMETHANE	µg/l	<5	<5	<5	<5	<5
BROMOFORM	µg/l	<5	<5	<5	<5	<5
BROMOMETHANE	µg/l	<10	<10	<10	<10	<10
CARBON TETRACHLORIDE	µg/l	<5	<5	<5	<5	<5
CHLOROBENZENE	µg/l	<5	<5	<5	<5	<5
CHLOROETHANE	µg/l	<10	<10	<10	<10	<10
2-CHLOROETHYL VINYL ETHER	µg/l	<10	<10	<10	<10	<10
CHLOROFORM	µg/l	<5	<5	<5	<5	<5
CHLOROMETHANE	µg/l	<10	<10	<10	<10	<10
DIBROMOCHLOROMETHANE	µg/l	<5	<5	<5	<5	<5
1,2-DICHLOROBENZENE	µg/l	<5	<5	<5	<5	<5
1,3-DICHLOROBENZENE	µg/l	<5	<5	<5	<5	<5
1,4-DICHLOROBENZENE	µg/l	<5	<5	<5	<5	<5
1,1-DICHLOROETHANE	µg/l	<5	4.5 (J)	<5	<5	<5
1,2-DICHLOROETHANE	µg/l	9.1	<5	<5	<5	<5
1,1-DICHLOROETHENE	µg/l	7.4	7.6	<5	<5	<5
1,2-DICHLOROETHENE	µg/l	<5	<5	<5	<5	<5
1,2-DICHLOROPROPANE	µg/l	<5	<5	<5	<5	<5
cis-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<5	<5
trans-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<5	<5
ETHYLBENZENE	µg/l	<5	<5	<5	<5	<5
METHYLENE CHLORIDE	µg/l	<10	<10	<10	<10	<10
1,1,2,2-TETRACHLOROETHANE	µg/l	<5	<5	<5	<5	<5
TETRACHLOROETHENE	µg/l	30	<5	<5	<5	<5
TOLUENE	µg/l	<5	<5	<5	<5	<5
1,1,1-TRICHLOROETHANE	µg/l	36	13	<5	<5	<5
1,1,2-TRICHLOROETHANE	µg/l	<5	<5	<5	<5	<5
TRICHLOROETHENE	µg/l	3 (J)	<5	<5	<5	<5
TRICHLOROFLOUROMETHANE	µg/l	<5	<5	<5	<5	<5
VINYL CHLORIDE	µg/l	<10	<10	<10	<10	<10
TOTAL VOCs	µg/l	152.1	25.1	0	0	0



TABLE 5  
(CONTINUED)

PARAMETER	UNITS	RAU-MW -007-16	RAU-MW -008-16	RAU-MW -009-16	RAU-MW -010-16	RAU-MW -011-16
WATER LEVEL	ft-msl	746.69	738.98	745.46	733.17	733.23
<u>GENERAL CHEMISTRY</u>						
pH	s.u.	6.1	6.8	6.0	5.9	6.8
SPECIFIC CONDUCTANCE	µmho/cm	920	960	520	25000	970
ALKALINITY AS CaCO <sub>3</sub>	mg/l	77	450	68	190	300
NITRATES AS NO <sub>3</sub> -N	mg/l	0.78	0.26	0.21	0.20	0.22
PHENOLICS	mg/l	0.007	0.006	<0.005	<0.006	<0.006
TOTAL LEAD	mg/l	0.010	0.033	0.013	0.054	0.009
DISSOLVED LEAD	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
POLYCHLORINATED BIPHENYLS	µg/l	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOLATILE ORGANIC COMPOUNDS</u>						
ACROLEIN	µg/l	<50	<50	<50	<250	<50
ACRYLONITRILE	µg/l	<50	<50	<50	<250	<50
BENZENE	µg/l	<5	<5	<5	<25	<5
BROMODICHLOROMETHANE	µg/l	<5	<5	<5	<25	<5
BROMOFORM	µg/l	<5	<5	<5	<25	<5
BROMOMETHANE	µg/l	<10	<10	<10	<50	<10
CARBON TETRACHLORIDE	µg/l	<5	<5	<5	<25	<5
CHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
CHLOROETHANE	µg/l	<10	<10	<10	<50	<10
2-CHLOROETHYL VINYL ETHER	µg/l	<10	<10	<10	<50	<10
CHLOROFORM	µg/l	<5	<5	<5	<25	<5
CHLOROMETHANE	µg/l	<10	<10	<10	<50	<10
DIBROMOCHLOROMETHANE	µg/l	<5	<5	<5	<25	<5
1,2-DICHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
1,3-DICHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
1,4-DICHLOROBENZENE	µg/l	<5	<5	<5	<25	<5
1,1-DICHLOROETHANE	µg/l	<5	<5	<5	640	13
1,2-DICHLOROETHANE	µg/l	<5	<5	<5	<25	<5
1,1-DICHLOROETHENE	µg/l	<5	<5	<5	64	<5
1,2-DICHLOROETHENE	µg/l	<5	<5	<5	<25	<5
1,2-DICHLOROPROPANE	µg/l	<5	<5	<5	<25	<5
cis-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<25	<5
trans-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<25	<5
ETHYLBENZENE	µg/l	<5	<5	<5	<25	<5
METHYLENE CHLORIDE	µg/l	<10	<10	<10	<50	<10
1,1,2,2-TETRACHLOROETHANE	µg/l	<5	<5	<5	<25	<5
TETRACHLOROETHENE	µg/l	<5	<5	<5	<25	<5
TOLUENE	µg/l	<5	<5	<5	<25	<5
1,1,1-TRICHLOROETHANE	µg/l	<5	<5	<5	230	<5
1,1,2-TRICHLOROETHANE	µg/l	<5	<5	<5	<25	<5
TRICHLOROETHENE	µg/l	<5	<5	12	<25	<5
TRICHLOROFLOUROMETHANE	µg/l	<5	<5	<5	<25	<5
VINYL CHLORIDE	µg/l	<10	<10	<10	35 (J)	<10
TOTAL VOCs	µg/l	0	0	12	969	13

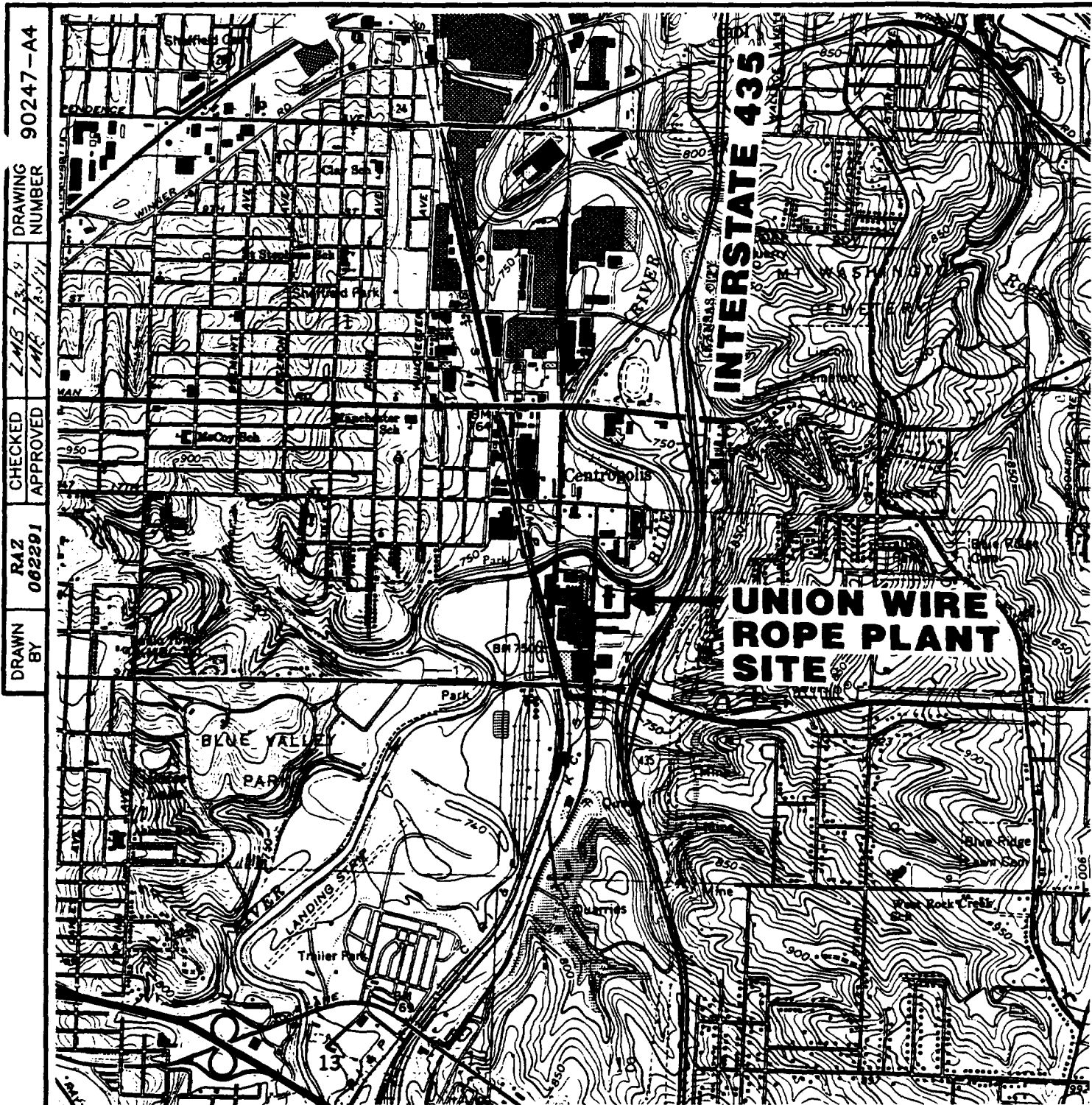




TABLE 5  
(CONTINUED)

PARAMETER	UNITS	RAU-MW -012-16	RAU-MW -012R-16	RAU-MW -000-16	TRIP BLANK
WATER LEVEL	ft-msl	734.39	REPLICATE	BLANK	
<u>GENERAL CHEMISTRY</u>					
pH	s.u.	6.6		7.0	
SPECIFIC CONDUCTANCE	µmho/cm	1600		57	
ALKALINITY AS CaCO <sub>3</sub>	mg/l	740		15	
NITRATES AS NO <sub>3</sub> -N	mg/l	0.10		<0.10	
PHENOLICS	mg/l	<0.005		0.010	
TOTAL LEAD	mg/l	0.038		0.012	
DISSOLVED LEAD	mg/l	<0.003		<0.003	
POLYCHLORINATED BIPHENYLS	µg/l	<1.0		<1.0	
<u>VOLATILE ORGANIC COMPOUNDS</u>					
ACROLEIN	µg/l	<50	<50	<50	<50
ACRYLONITRILE	µg/l	<50	<50	<50	<50
BENZENE	µg/l	<5	<5	<5	<5
BROMODICHLOROMETHANE	µg/l	<5	<5	<5	<5
BROMOFORM	µg/l	<5	<5	<5	<5
BROMOMETHANE	µg/l	<10	<10	<10	<10
CARBON TETRACHLORIDE	µg/l	<5	<5	<5	<5
CHLORO BENZENE	µg/l	<5	<5	<5	<5
CHLOROETHANE	µg/l	<10	<10	<10	<10
2-CHLOROETHYL VINYL ETHER	µg/l	<10	<10	<10	<10
CHLOROFORM	µg/l	<5	<5	<5	<5
CHLOROMETHANE	µg/l	<10	<10	<10	<10
DIBROMOCHLOROMETHANE	µg/l	<5	<5	<5	<5
1,2-DICHLOROBENZENE	µg/l	<5	<5	<5	<5
1,3-DICHLOROBENZENE	µg/l	<5	<5	<5	<5
1,4-DICHLOROBENZENE	µg/l	<5	<5	<5	<5
1,1-DICHLOROETHANE	µg/l	37	33	<5	<5
1,2-DICHLOROETHANE	µg/l	<5	<5	<5	<5
1,1-DICHLOROETHENE	µg/l	<5	<5	<5	<5
1,2-DICHLOROETHENE	µg/l	<5	<5	<5	<5
1,2-DICHLOROPROPANE	µg/l	<5	<5	<5	<5
cis-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<5
trans-1,3-DICHLOROPROPANE	µg/l	<5	<5	<5	<5
ETHYLBENZENE	µg/l	<5	<5	<5	<5
METHYLENE CHLORIDE	µg/l	<10	<10	<10	<10
1,1,2,2-TETRACHLOROETHANE	µg/l	<5	<5	<5	<5
TETRACHLOROETHENE	µg/l	<5	<5	<5	<5
TOLUENE	µg/l	<5	<5	<5	4 (J)
1,1,1-TRICHLOROETHANE	µg/l	<5	<5	<5	<5
1,1,2-TRICHLOROETHANE	µg/l	<5	<5	<5	<5
TRICHLOROETHENE	µg/l	<5	<5	<5	<5
TRICHLOROFLOUROMETHANE	µg/l	<5	<5	<5	<5
VINYL CHLORIDE	µg/l	<10	<10	<10	<10
TOTAL VOCs	µg/l	37	33	0	4





SCALE, FEET  
0 2000 4000



**REFERENCES:**

USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES,  
KANSAS CITY, MO-KS, AND INDEPENDENCE, MO,  
BOTH DATED 1964 & PHOTOREVISED 1970 AND  
1975. SCALES 1:24000.

**FIGURE 1**

**SITE LOCATION  
MAP**

UNION WIRE ROPE FACILITY  
KANSAS CITY, MISSOURI

PREPARED FOR  
ARMCO UNION WIRE ROPE  
KANSAS CITY, MISSOURI





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